

Sandia National Laboratories Primary Hazard Screening (PHS)

PHS Number: SNL06A00462-004

Bldg. 518, Room 1501 CINT Electron Beam
Lithography Room

I. Signatures (Electronic signature dates shown)

Risk Management Determination

Hazard Classification: **Low**Required Documentation: **PHS with integral HA**Facility/Project Designator: **Non-nuclear Facility**Date Created: **07/20/2009**DOE Order References: **425.1C**Results as of: **09/10/2009**Activity-level PHS: **N**

Author / Technical Review:

I am knowledgeable of the activities and hazards covered by this PHS and, after doing due diligence, the description, notes, identified hazards, analyses, and other information contained in this PHS are complete and accurate.

Author : **GIN,AARON**Org: **01725** **08/27/2009 11:54:28**

The description and notes describe and scope the activities performed under this PHS. All hazards have been identified. Questions are answered correctly and, as necessary, rationale or clarification is provided. All hazards in the HA have been analyzed, including the identification of controls for each hazard. I have performed the above reviews and concur that those items are complete and accurate.

ES&H Coordinator : **WRIGHT,GARY**Org: **017411** **CONCUR - 08/27/2009**

Quality Review:

This PHS meets minimum Corporate standards for 1) description/notes and 2) required information. There are no gross inconsistencies. I have performed the above reviews and concur that those items are complete and accurate.

PHS Team : **HALL,CHRISTOPHER ARMANDO**Org: **04126** **CONCUR - 09/10/2009**

Approver:

The description and notes describe and scope the activities performed under this PHS. All hazards have been identified. Questions are answered correctly and, as necessary, rationale or clarification is provided. All hazards in the HA have been analyzed, including the identification of controls for each hazard. I have reviewed this PHS and concur that its contents are accurate and complete. I will ensure that the requirements and commitments in this PHS are implemented prior to the start of work.

Approving Manager : **BOYE,CLINTON A.**

Org: **01720**

APPROVE - **09/10/2009**

II. PHS Purpose, Limitations, and Use in Work Planning and Control

Purpose of the PHS

For the scope of work identified, the PHS identifies:

- High-level (primary) hazards (e.g. chemicals, toxic gasses, explosives)
- Some, but not all controls (e.g. PPE, respirators, ventilation, lockout/tagout, and NEPA), please see the limitations section, below for additional information.
- A Hazard Classification, which determines the requirements for additional Safety Basis documents [e.g., Hazard Analysis (HA), Safety Assessment (SA), Safety Assessment Document (SAD), Documented Safety Analysis (DSA) etc.]
- For the hazards and controls identified, the PHS enables the identification and communication of:
 - Requirements documents (such as ES&H Manual chapters, sections, and supplements) that must be reviewed to determine specific requirements applicable to the work
 - ES&H Manual-required training
 - Action and Warning messages that highlight key requirements.

The Hazard Analysis section of the PHS is used to perform a high-level hazards analysis and controls selection for hazards with a Hazard Classification of 'Low' and, optionally, for Standard Industrial Hazards (SIH).

Limitations of the PHS for Use in Activity-level Work Planning and Control

Unless additional information is specifically added, a PHS **does not** contain all of the detail necessary to identify and control hazards at the activity/task level. The reasons for this include:

- PHSs are typically written at the project or work-area level and therefore, do not contain sufficient detail about individual tasks or the hazards/controls associated with them.
- While the PHS provides requirements for the hazards and controls identified, it **does not** provide a comprehensive list of all requirements in the ES&H Manual and related documents. Furthermore, many of the requirements are identified by reference to sections of the ES&H Manual, which must be evaluated for requirements applicable to the specific work being performed.
- It is impractical to ask enough questions to generate the level of detail necessary for activity/task-level hazard identification and control; human analysis must be employed. Consequently, details must be developed by a work planner, including:
 - Specific details about the hazard (e.g. what chemical, which laser, when, under what conditions, and where)
 - Other controls needed, since the only controls automatically identified are the ones with ES&H Manual requirements that result from their use. Important controls, such as access control, interlocks, shielding, monitoring, and personnel qualifications are not identified.
 - Specificity about controls (e.g. type of PPE, ventilation specifications)
 - Details on how and when you implement each control
 - Information on who needs to take what training

Recommended Use of the PHS to Support Activity-Level Work Planning & Control

The information developed in the PHS and any resultant Safety Basis documents should be utilized when performing the subsequent task of activity-level hazard identification, analysis, and control selection, where (1) the major work steps are identified; (2) the hazards associated with each major step are identified and analyzed; and (3) the controls for each hazard are identified and verified to be adequate to protect the involved workers. For the vast majority of work performed at Sandia, the Job Safety Analysis form (SF 2001-JSA) or equivalent is the recommended tool to use for this purpose. The JSA provides a systematic process for a team of involved workers and SMEs to ensure the activity-level work scope is rigorously analyzed to identify all potential hazards and specify appropriate controls for each hazard. Information from the PHS and Safety Basis documents is used as an input in developing the JSA, and the results of the JSA are used to develop TWDs, procedures, or other work instructions as appropriate.

In some cases, the PHS system may be used for activity level hazard identification, analysis, and controls identification, however, the PHS usually must be supplemented with additional information to provide the level of detail necessary to serve this purpose. In these cases, a PHS should be designated as an "Activity-Level PHS" on the PHS General Information page; however, these PHSs will be reviewed during the review and approval process to confirm that they contain the detail necessary to identify the hazards and controls at any stage of the work being performed. If determined to not be adequate, options include (1) revising the PHS to include adequate information; or (2) removing the "Activity-Level PHS" designation, and using a JSA/JSA-equivalent process to perform activity-level hazard identification, analysis, and control selection.

III. Table of Contents

I. Signatures (Electronic signature dates shown)	page 1
Risk Management Determination	page 1
II. PHS Purpose, Limitations, and Use in Work Planning and Control	page 3
III. Table of Contents	page 5
IV. General Information	page 7
Question Set Version	page 7
Document Status	page 7
Radiological Protection Level	page 7
Description	page 7
Notes from Document or Interview	page 7
Locations	page 8
Responsible Organization History	page 8
Planned Changes	page 8
V. Identified Hazards	page 9
VI. Required Actions	page 10
Off-Site Requirements	page 10
Warning Messages	page 10
Action Messages	page 10
Required Training	page 11
Regulatory Requirements	page 12
VII. Related Documents	page 14
NEPA Documents	page 14
Other Documents	page 14
VIII. Primary Hazard Screening Worksheets	page 15
Interview Worksheet	page 15
Controls Worksheet	page 23

IX. Hazard Analysis	page 24
X. Supplemental Information	page 27
PHS Input	page 27
Notes from Interview Questions	page 27
Notes from Controls Questions	page 27
User Entered Hazard Tables	page 27
Environmental Concerns Hazards	page 27
Mechanical Hazards	page 28
RGDs	page 28
Thermal Hazards	page 28
PHS Output - Results and Conclusions	page 28
Major Safety Concerns	page 28
Other Safety Concerns	page 29
Required Training	page 29
Results Based On Answers	page 29
Interquestion Dependency Concerns	page 29
XI. EOC Concerns	page 31

IV. General Information

Document Status

Question Set Version: I

Status: **APPROVED** Expiration Date: **09/10/2010**

Responsible Organization: **01725**

Radiological Protection Level for this facility or project: **Normal**

Description

The Electron Beam Lithography Area (Room 1501 and adjoining Equipment Chase Room 1519) encompasses the tools and support equipment needed to form patterned structures on substrates down to the nanometer scale. These patterns are formed using high-energy electrons that impinge upon charge-sensitive resist materials. Upon exposure and development of the resist, these patterns can be transferred to the underlying substrate using additive or subtractive cleanroom techniques.

Electron beam resist is spin-coated onto wafers or small substrates and baked. These samples are loaded into the electron beam lithography system (JEOL JBX-6300FS) where they are written with the electron beam. After pattern development, additive or subtractive methods can be used to transfer the pattern to the substrate. Other cleanroom tools and techniques are generally combined with the electron beam lithography process area to realize nanofabrication on various material systems.

Only authorized users of the electron beam lithography system are allowed to work under this PHS. Users can be authorized through an extensive On The Job Training (OJT) program through Aaron Gin.

This is an ongoing activity at the CINT facility and it is anticipated to continue throughout the lifetime of the e-beam system.

Notes from Document or Interview

General Document Notes

Responses to Action Messages from Sally Douglas, Center 1700 ESS&H Coordinator:

1. All Center 1700 personnel are current with required rad training.
2. Manager Jim Hudgens has completed RAD250.
3. Folks may or may not take new optional laser safety training.
4. This type of chemical work is covered by the Center 1700 Chemical Handling OP.
5. The solvent bench is ventilated (LEV). The face velocity will be measured/verified by Kirk Air prior to use.
6. OEA evaluation will eventually be done for CINT. SNL Pressure Safety experts will meet

with lab owner to make recommendations regarding excess flow valves, etc.

7. Flammable chemicals are stored in flammable cabinets and all other chemicals are segregated by type and appropriately stored.

8. Center personnel are sent annual reminders to perform required checks of extension cords, etc.

9. Center personnel are sent annual reminders to perform required inspections of hand tools.

10. PPE requirements are described in applicable OPs/Center Policies.

11. Qualification forms for pressure operators are optional. Personnel will complete or have completed the required PRS150 prior to performing applicable work.

12 & 13 No wastewater permits re required for this lab--only water is discharged and not in large quantities--no chemicals are discharged.

14. No special requirements for air emissions from this lab apply; only relatively small quantities of common solvents will be used in the ventilated solvent bench.

15. Hazardous waste shall be disposed of as per Chapter 19 of the SNL ES&H Manual.

16. TWDs have been/will be approved by subject-matter experts regarding PPE, etc.

17. Center personnel are sent annual reminders to perform required checks of extension cords, etc.

Locations

Primary Location

Site : **SSTP**

Area : **No Tech Area**

Bldg : **518**

Room : **1501**

Detail : **SNL/NM Bldg 518, Rm 1501**

Other Locations

None Entered

Responsible Organization History		
Organization Number	Effective (Starting) Date	This Org. Submitted Document for Review
01725	02/06/2006	Y

Planned Changes

The changes included here are basically to cover the new questions in the PHS document and also to update the actual electron beam lithography system in use (installed 5/2009) the JEOL JBX-6300FS. Additionally, the PHS includes several Hazard Analyses added 8-27-09.

V. Identified Hazards

Hazard Name	Hazard Description	Source (Question or Table)
traffic related hazards	traffic related hazards for injury	Required by general corporate business process
common electrical hazards	common electrical hazards	Required by general corporate business process
RGD below LOW hazard classification requirements.	potential for minor injury or illness	QUESTION 1
Other exempt shielded RGD	potential for minor injury or illness	QUESTION 1b(3)
Lasers	Potential eye and skin hazards	QUESTION 4
Unevaluated laser activity	potential exposure to laser beam	QUESTION 4a
Use or storage of chemicals	Potential personnel exposure to chemicals & fire protection regulatory requirements	QUESTION 5
Unevaluated chemical use	potential chemical overexposure	QUESTION 5a
Asphyxiant gases	Asphyxiant gas; Potential injury or death from unevaluated asphyxiant gas displacing oxygen in a workspace.	QUESTION 5d(1)
Standard industrial mechanical hazards	potential injury from mechanical forces	QUESTION 7
Standard industrial thermal hazard(s)	Contact with hot or cold objects	QUESTION 9a
Standard industrial pressure hazard(s)	Injury or damage	QUESTION 10
Environmental concern below LOW hazard classification requirements.	potential for regulatory action	QUESTION 15
Hazardous Wastes	potential for regulatory action	QUESTION 15d
Exposure to hazardous energy	potential injury to personnel from exposure to hazardous energy	QUESTION C3
Exposure to hazardous energy	potential injury to personnel from exposure to hazardous energy	QUESTION C3

VI. Required Actions

Off-Site Requirements:

NONE

Warning Messages:

1. Radiological safety training shall include procedures specific to an individual's job assignment. See CPR 400.1.1.32/MN471016, Radiological Protection Procedures Manual, Chapter 3, "Radiological Training Program," topic 4.3.2, for requirements and guidance. (QUESTION 1)
2. 10 Code of Federal Regulations Part 851, Worker Safety and Health Program, as implemented through various Sandia requirement documents (e.g., MN471001 ES&H Manual, PG470246, 10 CFR 851, Worker Safety and Health Program Plan), requires an exposure assessment of workplace hazards to ensure hazards have been identified and prevented or abated. (QUESTION 4a)
3. There are a variety of requirements applicable to chemicals. Refer to the portions of MN471001 ES&H Manual relevant to the activities being performed for requirements. (QUESTION 5)
4. 10 Code of Federal Regulations Part 851, Worker Safety and Health Program, as implemented through various Sandia requirement documents (e.g., MN471001 ES&H Manual, PG470246, 10 CFR 851 Worker Safety and Health Program Plan), requires an exposure assessment of chemical hazards to ensure hazards have been identified and prevented or abated. (QUESTION 5a)
5. All operators of the system must be qualified according to the requirements of the Pressure Safety Manual. The Pressure Operator Qualification Form (SF 2001-PQF) is available as an optional tool for documenting the applicable training and qualification requirements for pressure applications. See MN471000, Pressure Safety Manual, Chapter 2, "The Pressure Safety Program," for requirements and guidance on qualification of pressure operators. (QUESTION 10a)
6. Pressure systems and certain key components may need to be maintained and/or reevaluated at applicable intervals. See MN471000, Pressure Safety Manual, Chapters 6, 7, and 8 for requirements and guidance. (QUESTION 10f)
7. There may also be requirements for waste minimization and documentation of waste minimization efforts/results. Contact the Pollution Prevention Team for assistance with waste minimization. (QUESTION 15d)
8. All contractors performing servicing and maintenance on SNL-owned equipment shall perform LOTO when required in accordance with 29 CFR 1910.147 (OSHA Standards for General Industry) and comply with the following two additional requirements: (1) The contractor shall be briefed on SNL-specific LOTO devices and procedures applicable to the equipment under maintenance. (2) The contractor shall inform the SNL equipment owner and other authorized or affected workers of the contractor's energy control procedure/process, including any differences between that process and SNL-specific requirements. (QUESTION C3a(1))

Action Messages:

1. Contact your Division ES&H Team for a survey. (QUESTION 1a)
2. Write a Technical Work Document (TWD). See CPR400.1.1.32/MN471016, Radiological Protection Procedures Manual, Chapter 1, "Radiological Work Planning and Controls" and Chapter 10, "Radiation Generating Devices" for requirements and guidance. (QUESTION 1b(3))
3. California Only; Contact the Laser Safety Officer (LSO) for your laser control area (LCA), prior to performing Regulated Laser Activities, to evaluate exposure to laser beam hazards and determine control measures. (QUESTION 4a)
4. Contact the Deputy Laser Safety Officer (DLSO) for your laser control area (LCA), prior to performing Regulated Laser Activities, to evaluate exposure to laser beam hazards and determine control measures. (QUESTION 4a)
5. Contact the Industrial Hygienist on the appropriate Division ES&H Team to evaluate exposure to chemicals and determine control measures, prior to working with chemicals. (QUESTION 5a)
6. As required by the ES&H Manual, Section 19A, "Hazardous Waste Management," Members of the Workforce who are owners or generators of hazardous waste **shall plan** how to control hazards and appropriately manage their hazardous waste. (QUESTION 15d)

Required Training

[Note: This training is a regulatory requirement for one or more people involved in operations associated with identified hazards. Each class may not be required by all people working in the area.] Please note that some training classes are only provided occasionally. Please be sure to allow adequate lead-time for personnel to schedule and complete training.]

Course Code	Course Title	Exclusions	Training Interval (Years)	One-time Training
ENV112	HAZARDOUS WASTE & ENVIRONMENTAL MANAGEMENT TRAINING	(all locations other than SNL/CA will take ENV112)	1	No
ESH100	ES&H AWARENESS		1	No
ESH200	SAFETY MANAGEMENT		--	Yes
HAZ101	EMPLOYEE BASIC HAZCOM	LAB100 is acceptable for emergency response activities, if already completed	2	No
HAZ103	SITE-SPECIFIC HAZCOM		2	No
LAB100	LABORATORY STANDARD INFORMATION AND TRAINING	LAB100 (HAZ101 is acceptable if already taken)	2	No
LAB103	SITE-SPECIFIC LABORATORY SAFETY TRAINING		2	No
LAS200SPEC	SITE SPECIFIC TRAINING FOR CLASS 3B & 4 LASER USERS		3	No

Course Code	Course Title	Exclusions	Training Interval (Years)	One-time Training
LAS202	FUNDAMENTALS OF LASER SAFETY		3	No
PRS150	PRESSURE SAFETY ORIENTATION	for all operators of the system	--	Yes
PRS150R	PRESSURE SAFETY ORIENTATION REFRESHER		3	No
RAD214	RADIATION - GENERATING DEVICE SAFETY TRAINING	RAD214 unless RAD210, RAD230, or SNL qualified RCT training.	2	No
RAD219	RADIATION - GENERATING DEVICE CUSTODIAN TRAINING	for both primary alternate custodians	1	No
RAD250	MANAGEMENT OF RADIOLOGICAL OPERATIONS		2	No

Regulatory Requirements

Regulatory and Standards Drivers for this Facility or Lab:

[Note: ES and H Manual sections listed below contain requirements and guidance that pertain to the hazards you have identified in this PHS. It is your responsibility to ensure these requirements have been fulfilled.]

1. (QUESTION 1) CPR400.1.1/MN471001 - ES&H Manual, Section 13C, "Authorization Basis Documentation Process" for SIH, Low, Moderate, and High; unknown hazard potential since item(s) have not gone through the standards, testing rigor and hazard analysis associated with
2. (QUESTION 1) CPR400.1.1.32/MN471016 - Radiological Protection Procedures Manual, Chapter 3, "Radiological Training Program"
3. (QUESTION 1) CPR400.1.1.32/MN471016, Radiological Protection Procedures Manual, Chapter 10, "Radiation Generating Devices"
4. (QUESTION 1b(3)) CPR400.1.1.32/MN471016, Radiological Protection Procedures Manual, Chapter 10, "Radiation Generating Devices"
5. (QUESTION 1b(3)) CPR400.1.1.32/MN471016, Radiological Protection Procedures Manual, Chapter 1, "Radiological Work Planning and Controls."
6. (QUESTION 4) MN471001 - ES&H Manual, Section 6G, "Lasers and Intense Light"
7. (QUESTION 4a) MN471001 - ES&H Manual, Section 6G, "Lasers and Intense Light"
8. (QUESTION 5) MN471001, ES&H Manual, Section 6D, "Hazard Communication Standard," and Section 6E, "Laboratory Standard - Chemical Hygiene Plan"
9. (QUESTION 5) MN471001 - ES&H Manual, Section 6E, Laboratory Standard - Chemical Hygiene Plan
10. (QUESTION 5) MN471001, ES&H Manual, Section 6U, "Hazardous Material (Chemical and Biological) Inventory"
11. (QUESTION 5d(1)) RQ=MN471001, ES&H Manual, Section 6T, "Asphyxiating Environments"
12. (QUESTION 7a) MN471001 - ES&H Manual, Section 4N, "Industrial Machine and Portable Power Tool Safety"
13. (QUESTION 10a) MN471000 - Pressure Safety Manual, Chapter 2, "The Pressure Safety Program"
14. (QUESTION 10d) MN471000 - Pressure Safety Manual, Chapter 9, "Documenting the Operational Safety of Pressure Systems"
15. (QUESTION 10e) MN471000 - Pressure Safety Manual, Chapter 9, "Documenting the Operational Safety of Pressure Systems"
16. (QUESTION 10f) MN471000 - Pressure Safety Manual, Chapter 6, "Testing and Evaluating Pressure Systems"
17. (QUESTION 10f) MN471000 - Pressure Safety Manual, Chapter 7, "Verifying the Safe Operation of Pressure Systems"
18. (QUESTION 10f) MN471000 - Pressure Safety Manual, Chapter 8, "Servicing Pressure Vessels and Components"
19. (QUESTION 15d) MN471001 - ES&H Manual, Section 19A, "Hazardous Waste Management" (all locations other than SNL/CA)
20. (QUESTION 15d) MN471001, ES&H Manual, Chapter 20, "Waste Management at SNL/CA" (SNL/CA only)
21. (QUESTION C1) MN471001 - ES&H Manual, Section 6P, "Local Exhaust Ventilation (LEV)"
22. (QUESTION C4) MN471001 - ES&H Manual, Section 10B, "National Environmental Policy Act (NEPA), Cultural Resources, and Historic Properties"
23. (Required by general corporate business process) MN471001 - ES&H Manual, Section 4B, "Electrical Safety Practices"
24. (Required by general corporate business process) MN471001 - ES&H Manual, Section 4K, "Traffic Safety"
25. (Required by general corporate business process) MN471001, ES&H Manual, Section 21, "Technical Work Documents (TWDs)"

VII. Related Documents

NEPA Documents	Number	Project End Date
CINT Integration Laboratories (1501, 1504, 1523, 1525, and 1527)	SNA07-0202	

Other Documents	Number	Type	Published Date
Environmental Assessment for CINT	Environmental Assessment		
Baseline OEA (518/1501)/Electron Beam Lithography Room	ER2007-2559	ESHER	07/13/4007

VIII. Primary Hazard Screening Worksheets

Version of Questions:I

Operation Type:Facility or Lab

Interview Worksheet:

Questions

Answers

- 1 **Radiation-Generating Devices (RGDs):** Is there a radiation-generating device (RGD)? Yes
(Answer this question "no" if the RGDs are registered in storage.)

RGDs								
Source Name	RGD #	RGD Class	RGD Type	Accl. Voltage	Com'l Available	Modified	Custodian	SNL/NM Owned
JEOL JBX-6300FS	580	Exempt Shielded	Inherently Safe	100kV	Yes	No	Aaron Gin	Yes
Location: Site: SSTP, Area: No Tech Area, Building: 518, Room: 1501 Location Details: Bldg 518/1501								

Questions

Answers

- 1a Unless exempt, is the RGD *registered* with the Device Control Program? Yes

Notes: RGD is listed in DARTS.

- 1b Are there any of the following radiation- generating devices (RGDs) / operations?
Place a check mark to the right of all that apply.
- 1b(1) Certified cabinet No
- 1b(2) X-ray Diffraction or fluorescence analysis equipment No
- 1b(3) Other exempt-shielded RGD Yes

Notes: This is an electron beam lithography system, which is similar in almost all respects to a scanning electron microscope.

- 1b(4) X-ray generator or particle accelerator (Do your activities include an Accelerator as defined in the Help Text; **Please read the help text, since this question has significantly changed.**) No
- 1b(5) Other shielded RGD No
- 1b(6) Portable or mobile radiography RGD not using a radioactive source No
- 1b(7) Fixed device with partial shielding No
- 1b(8) Portable analytical device with an open-beam configuration No
- 1b(9) Open Installation not in the preceding classes No
- 1b(10) Unattended Installations No
- 1b(11) Neutron Generator Operations No
- 1c Will anyone enter any of the following areas?
- 1c(1) **Controlled Area (unescorted access to do radiological work)** No
- 1c(2) Radiation Area No
- 1c(3) High Radiation Area No

	Questions	Answers
1c(4)	Very High Radiation Area	No
1d	Are routine exposures <i>above</i> 100 <i>mrem</i> per year likely?	No
1e	Could a member of the public be exposed by the operation? (This usually involves portable or mobile radiography operations).	No
1f	Will there be radiological work in a <i>foreign country</i> or territory?	No
1g	Will the activity involve an RGD owned or operated by a party other than Sandia or Sandia's subcontractors?	No
1h	Is there an RGD or a facility for an RGD acquired, built, or modified on or after January 1, 1996-excluding those RGDs classified as inherently safe or a certified cabinet?	No
1i	Will radiation <i>monitoring</i> instruments be used in this activity by MOW other than qualified Radiological Control Technicians?	No
1j	Will scrap metal generated from the project or activity come from a radiological area?	No
2	Radioactive Materials: Is radioactive material present?	No
3	Explosives and Ammunition: Are any explosives or ammunition (including explosive waste) managed, handled, processed, used, or stored?	No
4	Lasers: Do the activities covered by this PHS involve Regulated Laser Activities?	Yes
4a	Has the Industrial Hygiene Program performed an exposure assessment of the Regulated Laser Activities covered by this PHS?	No
Notes: SNL IH will be contacted to perform an OEA to include laser activities.		
4b	Do the activities involve directing the beam of any class of visible laser (400 - 700 nanometer) or any Class 3B or Class 4 laser into navigable airspace or where the beam could affect personnel not associated with this activity?	No
5	Chemicals: (Review the Help text before answering this question.) Do the activities involve chemicals?	Yes
Notes: common solvents, photoresists, house nitrogen, SF6; no solder Chemicals will probably be moved in to this lab in August. Until then, no chemicals will be in the lab.		
5a	Has the Industrial Hygiene Program performed an exposure assessment of all of the current activities involving chemicals covered by this PHS?	No
Notes: SNL IH will be contacted to conduct a follow-up OEA to cover all current chemical activities.		
5b	Do any of the activities include?	No
	- Cleanup operations at hazardous waste sites (e.g., environmental restoration [ER] sites - Hazardous waste operations at treatment, storage, and disposal (TSD) facilities - Emergency response or post-emergency response	
5c	Will activities have, use, synthesize, or liberate unbound engineered nanoscale particles (UNP)?	No
5d	(Review the help text before answering this question.) Do the activities involve storage or utilization of simple asphyxiants?	Yes
Notes: The electron beam lithography system uses two sources of house nitrogen to control the vacuum valves and also to purge the sample exchange chamber. Backup bottles of pressurized N2 gas are kept in the chase in the case of a house nitrogen failure.		
5d(1)	In an accidental gas or cryogenic liquid asphyxiant release, could more than 560 cubic feet of asphyxiating gas be released into the work space?	Yes

Questions

Answers

Notes: House nitrogen sources could potentially displace more than 560 cubic feet of N2 gas.

An oxygen deficiency evaluation for 518 / room 1501 was completed in Jan 07 (ER2007-1696). The results of the evaluation show that there is no plausible potential for an oxygen deficient environment to develop in this lab due to a worse-case nitrogen release. The pressure data package for the lab should be modified to include the excess flow valve(s) in use. Nitrogen use should stop (be valved off) upon loss of HVAC to the lab. No further controls are warranted at this time.

5e	Are the hazardous chemicals, hazardous substances, or hazardous waste involved in these activities considered corrosive materials?	No
5f	Do these activities involve the use of hydrofluoric acid?	No
5g	Do chemicals used in the activities meet or exceed the Operational Permit Amounts for hazardous materials listed in the International Fire Code (IFC) and National Fire Protection Association (NFPA) Guidance? (Please see IFC 105.6.20 Table 25-1 in the Help file for SNL Fire Protection's implementation requirements.)	No
5h	Do the activities involve the storage, dispensing, or use of flammable or combustible liquids?	No
5i	Do activities involve any of the following? <ul style="list-style-type: none"> - Flammable chemicals in quantities greater than 5 liters of liquid, 1 kg of solid, or 500 cubic feet of gas (at STP) in any single container or manifolded series of containers - Equipment connected to a house system for flammable gases - Reactive chemicals in quantities greater than 1 liter of liquid, 100 g of solid, or 500 cubic feet of gas in any single container or manifolded series of containers - Oxidizers, other than nitric acid, in quantities greater than 5 liters of liquid, 1 kg of solid, or 500 cubic feet of gas in any single container or process - Pyrophoric chemicals in total quantities greater than 500g - Metal powders in quantities greater than 1 kg 	No
5j	Do the activities include a process that involves highly hazardous chemicals at or above twenty-five percent of the Process Safety Management standard threshold quantities, or are there flammable liquids or gases involved in a process in a quantity of greater than 2,500 pounds?	No
5k	Do activities use or store toxic gases in quantities greater than the de minimus quantities listed in the Help file?	No
5l	(Refer to help file to determine if quantities have been exceeded.) Do the activities use or store hazardous chemicals in quantities equal to or greater than the Emergency Management screening threshold quantities?	No
6	Electrical: Do workers conduct any of the following tasks? <ul style="list-style-type: none"> - Work on or near (within the limited approach boundary - 3.5 feet) exposed and energized (greater than or equal to 50 volts) electrical circuits or contact energized electrical circuit parts with tools or test probes? - Operate circuit breakers or disconnect switches operating at or above 50 Volts and 5 mA or more? - Perform non electrical work, but might contact exposed and energized electrical circuits - <i>operating at 50 volts or greater</i> - with equipment or materials, such as ladders, cranes, paint roller extensions, or forklifts? - Use Equipment that operates at 50 Volts or more and is not listed by an OSHA approved Nationally Recognized Testing Laboratory (e.g., UL) and operating at over 50 Volts, including extension cords or power strips? 	Yes
6a	Do workers work on or near (within the limited approach boundary - 3.5 feet) exposed and (greater than or equal to 50 volts) energized electrical circuits or contact energized electrical circuit parts with tools or test probes?	No

	Questions	Answers
6b	Do workers operate circuit breakers or disconnect switches operating at 50 Volts or more and 5 mA or more ?	No
6c	Do workers perform non electrical work , but might contact exposed and energized electrical circuits - operating at 50 volts or more - with equipment or materials, such as ladders, cranes, paint-roller extensions, or forklifts?	No
6d	Do workers use equipment that operates at 50 Volts or more and is not listed by an OSHA-approved Nationally Recognized Testing Laboratory (e.g., UL), including extension cords and power strips?	Yes
6d(1)	Have all of the non-NRTL-approved electrical equipment or appliances been approved and documented using the Sandia non-NRTL-evaluation process?	Yes
7	Mechanical: Does the facility or activity involve any of the following hazards or activities? <ul style="list-style-type: none"> - machine shop equipment - portable power tools - powder-actuated tools - centrifuge operations - forklifts - motorized hand trucks - cranes/hoists, miscellaneous lifting devices, - industrial robots or industrial robotic systems - operate light or heavy earth-moving equipment - excavations - trenches - floor or wall penetrations - stored or kinetic mechanical energy that could cause an injury during normal working conditions 	Yes

Mechanical Hazards			
Source Name	Potential Hazard	Com'l Available	Modified
Electron Beam Lithography	Pinch Points, Small Hoist on Machine, Load-Lock	Yes	No
	Location: Site: SSTP, Area: No Tech Area, Building: 518, Room: N/A Location Details: E-Beam Lithography Area, Rm 1501 Comments: JEOL JBX-6300FS hoist is only used for installation/deinstallation by manufacturer only		

	Questions	Answers
7a	Do workers operate machine shop equipment?	No
7b	Do workers operate portable power tools?	No
7c	Do workers operate powder-actuated tools (also known as explosive-actuated fastening tools)?	No
7d	Does this facility or project activity use centrifuges?	No
7e	Are forklifts used in any operations?	No
7f	Are motorized hand trucks used in any operations?	No
7g	Are overhead cranes/hoists, mobile cranes, miscellaneous lifting devices (shop or gantry crane), or rigging used in any operations?	No
7h	Are industrial robots or industrial robotic systems used in this project or activity?	No
7i	Do workers operate light or heavy earth-moving equipment?	No

Questions

Answers

- 7j Do workers perform or come into close proximity to any of these activities: No
- Excavations
 - Trenches
 - Floor or Wall Penetrations
- 7k Do activities involve stored or kinetic mechanical energy that could cause an injury under normal working conditions? No
- 8 **Nonionizing Radiation:** At any time, do activities produce nonionizing radiation (NIR) (excluding lasers)? No
- 9 **Thermal:** Do thermal hazards or thermal stressors exist in the work area? Yes

Thermal Hazards	
Source Name	Temperature
Electron Beam Lithography	250 C
	Location: Site: SSTP, Area: No Tech Area, Building: 518, Room: N/A
	Location Details: E-Beam Lithography Area, Rm. 1501 Comments: Bakeout Procedure for JEOL JBX-5FE

Questions

Answers

- 9a Do thermal hazards exist in the work area in such a manner that Members of the Workforce may be exposed under normal conditions or in a foreseeable emergency? Yes
- 9b Do thermal stressors exist in the work area? No
- 10 **Pressure:** Are workers involved in the design, installation, operation, or maintenance of a pressure system (including pressure, vacuum, cryogenic fluid applications)? Yes
- 10a Do personnel function as pressure system operators? Yes
- 10b Do personnel function as a pressure installers? No
- 10c Do personnel handle cryogenic fluids, or design, install, or operate cryogenic fluid-handling systems? No
- 10d Does an up-to-date data package or Pressure Safety Analysis Report, reflecting current personnel and system configuration, exist for all systems? Yes
- 10e Do supplier-established pressure ratings exist for all systems and system components? Yes
- 10f Are pressure system (or component) reevaluations being performed according to the requirements of the Pressure Safety Manual? (A common example would be the replacement or retesting of pressure relief valves.) No
- 11 **Noise:** At any time, do activities produce potentially high noise levels? No
- Noise that would require you to raise your voice to be heard by another person three feet away (greater than 85 decibels) (potential sources include: compressors, shredders, heavy machinery, saws, grinders, pumps, etc.)
 - High impulse/impact noise (potential sources include: explosions, gunshots, jackhammers, pressure releases, etc.)
 - Ultrasound noise (potential sources include: ultrasonic welders, ultrasonic cleaners, and turbo-pumps, fluid flow, etc.)

Questions

Answers

- 12 **Miscellaneous Hazards:** Does the facility or activity involve any of the following hazards or activities? No
- Ergonomic or musculoskeletal stressors
 - Construction-like activities
 - Work around asbestos
 - Ladders
 - Elevated surfaces (other than ladders)
 - Commercial underwater diving
 - animals and hazardous Plants
 - Aircraft
 - Airborne objects (other than aircraft)
 - Firearms
 - Use of human subjects
 - Use of Sealed Drums
- 13 **Outside of Manufacturer's Recommendations:** Does this work involve the use of **equipment, tools, or materials** outside of their design specifications or outside of the manufacturer's recommendations? (See Help Text for examples). Please enter each item into the hazard table. No
- 14 **Non-Commercial Hazards:** Does this work involve the use of noncommercial equipment or apparatus (excluding robots, robotics systems, and equipment where the only hazard is a pressure system that has a pressure safety data package)? Please **enter each** noncommercial piece of equipment into the hazard table. No
- 15 **Environmental Concerns:** Are there any potential **environmental concerns** with this activity that align with the SNL Environmental Management System (EMS) aspects, such as chemical use, fuel or oil storage, waste generation (except sanitary trash), construction activities, disturbance to habitat or protected species, or discharges to the air, ground surface, ground water, or the sewer systems? Yes

Environmental Concerns Hazards		
Source Name	Type	Est. Quantity
Exhausted Air Emissions	Air Quality	Within Regulatory Requirements
	Location: Site: SSTP, Area: No Tech Area, Building: 518, Room: N/A Location Details: E-Beam Lithography Area, Rm. 1501 Comments: Potential Air Quality Concern	
Wastewater	Water Quality	Within Regulatory Requirements
	Location: Site: SSTP, Area: No Tech Area, Building: 518, Room: N/A Location Details: E-Beam Lithography Area, Rm. 1501 Comments: Potential Water Quality Concern from AWN System	

Questions

Answers

- 15a **Wastewater:** Are there any wastewater discharges in this activity? No
- 15b **Air:** Are there any air discharges or emissions at this activity? No
- 15c **Radioactive Waste:** Will this activity generate any radioactive waste, or will Members of the Workforce be required to handle radioactive waste? No
- 15d **Hazardous Waste:** Will this activity generate any hazardous waste, or will Members of the Workforce be required to handle hazardous waste? Yes

Notes: Hazardous Waste is managed in accordance with Center 1700 Light Labs Chemical Handling and PPE OP (1700-LL-Chem-PPE).

- 15d(1) **Less-Than-90-Day Accumulation Area:** Will this activity store any hazardous waste in a **less-than-90-day accumulation area**? No

	Questions	Answers
15d(2)	Acutely Hazardous Waste: Will this activity generate any acutely hazardous waste ?	No
15d(3)	Waste Containing Mercury: Will this activity generate any waste containing mercury (e.g., switches, thermometers, manometers, elemental mercury (Hg), or mercury compounds [e.g., mercuric oxide (HgO)], etc.)?	No
15e	Mixed Waste: Will this activity generate any mixed waste , or will Members of the Workforce be required to manage mixed waste?	No
15f	Infectious / Biohazardous Waste: Will this activity generate any infectious or biohazardous waste, or will Members of the Workforce be required to handle infectious or biohazardous waste?	No
15g	Radioactive Contamination: Will this activity be conducted in an area for which a reasonable potential exists for introducing radioactive contamination or causing activation of material that may become waste?	No
15h	Material or Waste of Unknown Origin: Will this activity require handling material or waste of unknown origin?	No
15i	Fuels and Oil Storage: Does this activity use a fuel or oil storage container capable of containing 55 gallons or more?	No
15j	Discharges to Ground Surface: Does this activity have a potential for any discharges to the ground surface ?	No
15k	Improvements/modifications to structure/building exteriors and landscaping: Will this project involve activities that require modifications to the exteriors of structures and buildings or modification to existing landscape, including removal of vegetation?	No
15l	Disturbance to habitat or protected species: Will this project involve activities that will disturb habitat or protected species, including wildlife management and outdoor projects or testing activities?	No
16	Packaging and Transportation of Hazardous Materials: Will any activities covered by this PHS involve the packaging and transportation of hazardous material (including explosives or radioactive material)?	No
17	Fire Protection Concerns: Will the activity include any of the following? - Members of the Workforce modifying in any way any fire suppression or life safety system (fire rated walls, fire doors, fire sprinklers, fire alarm devices, fire extinguishers, or means of egress)? - Members of the Workforce performing hot work in association with this facility or project activity?	No
18	Biological Materials: <i>(see Help text before answering this question.)</i> Do activities involve the use of or potential exposure to biological materials?	No
19	Confined Spaces: Are confined spaces present in the work area?	No
20	Beryllium: Do operations include any activities that? <i>(Review the Help text before answering this question)</i> - Use or handle beryllium, beryllium-containing alloys or beryllium oxides? - Create or work with beryllium ceramics ? - Handle waste potentially-contaminated with beryllium or waste containing beryllium? - Perform decontamination of beryllium contamination? - Entail work in a beryllium contaminated building or area? - Apply abrasive or destructive methods to metal objects, articles, weapon components or bar stock, potentially containing beryllium? - Use non sparking tools containing beryllium?	No

	Questions	Answers
21	<p>Other Hazards: Are there any:</p> <ul style="list-style-type: none">- Hazards that have not been adequately addressed in other questions. (e.g., polar bears, foreign travel, specific chemical hazards, natural hazards [e.g., wind, excessive water, radon, or overhead trees]), or- Hazards of unknown magnitude (e.g., emergency response, hazards encountered by roving personnel) <p>Enter all of these hazards in the User- Specified Hazards table. Enter "Low" as the Hazard Classification for hazards of unknown magnitude, unless the Safety Basis Department has determined otherwise.</p>	No

Controls Worksheet:

	Questions	Answers
C1	Local Exhaust Ventilation: Do the activities covered by this PHS use local exhaust ventilation (LEV) (e.g., laboratory hoods, glove boxes, downdraft tables, "elephant trunks," canopy hoods, paint booths, slot ventilation, portable welding ventilation, etc.)?	Yes
C2	Personal Protective Equipment: Are hazards (e.g., chemicals radiological, electrical, mechanical, thermal, flying particles and/or falling or rolling objects) encountered that are capable of causing injury or impairment in the function of any part of the body through absorption, inhalation, or physical contact?	No
C3	Control of Hazardous Energy (LOTO): Do you have any equipment in your operations that requires any of the following activities? <ul style="list-style-type: none"> - Construction - Installation - Setup - Adjustment - Inspection - Modification - Maintenance - Service - Lubrication - Cleaning - Unjamming - Making adjustments or tool changes 	Yes
C3a	While performing the servicing and maintenance activities identified above, is there potential for injury from the unexpected energization or startup of the machines, equipment, or process from a release of stored energy?	Yes
C3a(1)	Will service or maintenance be done on a machine, equipment, or a process by the Members of the Workforce within your organization ?	No
C3b	Are there any activities where control of hazardous energy sources is only necessary for protection of configuration, equipment, or property (i.e., not for personnel protection)?	No
C4	NEPA Compliance: Has this project or activity been reviewed for National Environmental Policy Act (NEPA) compliance?	Yes
Notes: Has an Environmental Assessment for the Center for Integrated Nanotechnologies at SNL/NM (March, 2003)		
C4a	Are all relevant NEPA documents listed in the Documents section of this PHS?	Yes

IX. Hazard Analysis (HA) Section

Hazard Analysis

Source Name or Question: Question 4a
Source Reason: Unevaluated laser activity
Hazardous Condition: potential exposure to laser beam

PHS Identified 'Low' Hazard.

Author's Comment: On the new JBX-6300FS system, there is virtually no way that a user could access the laser beam under normal working conditions.

Cause: System/Component/Equipment Failure

There is a very small chance that both the laser physical barriers and interlocks fail on the electron beam lithography system.

Consequence: Minor Illness/Injury

If a worker stares into the HeNe laser, eye injury could occur.

Mitigation: Active Engineering Control-Electrical/Mechanical Access Control System

The JBX-6300FS has physical barriers (lasers are housed inside opaque tubes) as well as engineering controls (interlocks to ensure tubes are in place before the laser can operate) to protect workers. There is virtually no way a worker could get injured unless they intentionally defeat the interlocks, remove the physical housings and stare into the beam.

Mitigation: Procedural (Monitoring etc.)-Other

All workers on the e-beam lithography system must receive extensive OJT from the tool owner.

Author Assessment: Applied Mitigation and Prevention are sufficient.

Source Name or Question: Question 5d(1)
Source Reason: Asphyxiant gases
Hazardous Condition: Illness / Asphyxiation

PHS Identified 'Low' Hazard.

Author's Comment: We use two house nitrogen gas lines to actuate the vacuum valves and to purge the system loadlock. Furthermore, there are two standard size bottles of compressed nitrogen gas to serve as backup to the house system upon failure.

Cause: System/Component/Equipment Failure

There is a small chance that a house nitrogen gas line could rupture, which could cause an asphyxiating environment in the lab.

Consequence: Death [Worker]

In the worst case, an uncontrolled release of nitrogen gas combined with workers unable to leave the lab area, could result in death.

Mitigation: Active Engineering Control-Pressure Control System/Device (dp controller/pressure relief valve)
The house nitrogen drops all include a restrictive flow orifice (RFO) device, which would limit gas flows to safe levels if (for instance) a regulator failed downstream.

Mitigation: Active Engineering Control-Pressure Control System/Device (dp controller/pressure relief valve)
The house nitrogen gas drops include a regulator to control the flow of gas to our system. This limits any potential gas release downstream to safe levels from the drop.

Mitigation: Active Engineering Control-Pressure Control System/Device (dp controller/pressure relief valve)
The electron beam lithography system has regulators at the house nitrogen inlets, which further protect the user if, for instance, a nitrogen line ruptured within the system itself.

Author Assessment: Applied Mitigation and Prevention are sufficient.

Source Name or Question: Question 5a
Source Reason: Unevaluated chemical use
Hazardous Condition: potential chemical overexposure

PHS Identified 'Low' Hazard.

Author's Comment: Chemical handling for this operation only consists of traditional solvent and various polymer resists (PMMA, acrylic).

Cause: Human Error

Worker exposure to various cleanroom standard chemicals and electron beam resists may be possible.

Consequence: Minor Illness/Injury

Overexposure to various solvents may include nausea and other symptoms, depending on the chemical composition and level.

Mitigation: Training-Other

Course Id: LAB100 **Title:** LABORATORY STANDARD INFORMATION AND TRAINING

LAB100 training for basic lab procedures.

Mitigation: Procedural/TWD (SOP/OP/RWP)-Other

Doc Id: SNA07-0202 **Title:** CINT Integration Laboratories (1501, 1504, 1523, 1525, and 1527)

NEPA documentation covering integration laboratories

Mitigation: Training-Other

Course Id: ESH100 **Title:** ES&H AWARENESS

ES&H training to determine general safety of the work environment.

Author Assessment: Applied Mitigation and Prevention are sufficient.

Note: 13 hazard analysis(es) were not reported, because no (optional) hazard analysis was performed for them.

X. Supplemental Information

PHS Input

Notes from Interview Questions

(Q 1a) - RGD is listed in DARTS.

(Q 1b(3)) - This is an electron beam lithography system, which is similar in almost all respects to a scanning electron microscope.

(Q 4a) - SNL IH will be contacted to perform an OEA to include laser activities.

(Q 5) - common solvents, photoresists, house nitrogen, SF6; no solder

Chemicals will probably be moved in to this lab in August. Until then, no chemicals will be in the lab.

(Q 5a) - SNL IH will be contacted to conduct a follow-up OEA to cover all current chemical activities.

(Q 5d) - The electron beam lithography system uses two sources of house nitrogen to control the vacuum valves and also to purge the sample exchange chamber. Backup bottles of pressurized N2 gas are kept in the chase in the case of a house nitrogen failure.

(Q 5d(1)) - House nitrogen sources could potentially displace more than 560 cubic feet of N2 gas.

An oxygen deficiency evaluation for 518 / room 1501 was completed in Jan 07 (ER2007-1696). The results of the evaluation show that there is no plausible potential for an oxygen deficient environment to develop in this lab due to a worse-case nitrogen release. The pressure data package for the lab should be modified to include the excess flow valve(s) in use. Nitrogen use should stop (be valved off) upon loss of HVAC to the lab. No further controls are warranted at this time.

(Q 12a) - A wheeled chair allows easier access the awkwardly-positioned control for aperture alignment, and operating in the dark for optimum viewing of phosphor screen is not done often enough nor for long enough duration to create a true ergonomic issue.

(Q 15d) - Hazardous Waste is managed in accordance with Center 1700 Light Labs Chemical Handling and PPE OP (1700-LL-Chem-PPE).

(Q 17a) - Has an Environmental Assessment for the Center for Integrated Nanotechnologies at SNL/NM (March, 2003)

Notes from Controls Questions

(Q C4) - Has an Environmental Assessment for the Center for Integrated Nanotechnologies at SNL/NM (March, 2003)

User Entered Hazard Tables

Environmental Concerns Hazards		
Source Name	Type	Est. Quantity
Exhausted Air Emissions	Air Quality	Within Regulatory Requirements
	Location: Site: SSTP, Area: No Tech Area, Building: 518, Room: N/A Location Details: E-Beam Lithography Area, Rm. 1501 Comments: Potential Air Quality Concern	
Wastewater	Water Quality	Within Regulatory Requirements
	Location: Site: SSTP, Area: No Tech Area, Building: 518, Room: N/A Location Details: E-Beam Lithography Area, Rm. 1501 Comments: Potential Water Quality Concern from AWN System	

Mechanical Hazards

Source Name	Potential Hazard	Com'l Available	Modified
Electron Beam Lithography	Pinch Points, Small Hoist on Machine, Load-Lock	Yes	No
Location: Site: SSTP, Area: No Tech Area, Building: 518, Room: N/A Location Details: E-Beam Lithography Area, Rm 1501 Comments: JEOL JBX-6300FS hoist is only used for installation/deinstallion by manufacturer only			

RGDs

Source Name	RGD #	RGD Class	RGD Type	Accl. Voltage	Com'l Available	Modified	Custodian	SNL/NM Owned
JEOL JBX-6300FS	580	Exempt Shielded	Inherently Safe	100kV	Yes	No	Aaron Gin	Yes
Location: Site: SSTP, Area: No Tech Area, Building: 518, Room: 1501 Location Details: Bldg 518/1501								

Thermal Hazards

Source Name	Temperature
Electron Beam Lithography	250 C
Location: Site: SSTP, Area: No Tech Area, Building: 518, Room: N/A Location Details: E-Beam Lithography Area, Rm. 1501 Comments: Bakeout Procedure for JEOL JBX-5FE	

PHS Output - Results and Conclusions**Major Safety Concerns**

The hazard classification is: **Low**

The required documentation is: **PHS with integral HA**

The hazard classification is: Low since this Facility or Lab involves:

(QUESTION 4a) potential exposure to laser beam

(QUESTION 5a) potential chemical overexposure

(QUESTION 5d(1)) Asphyxiant gas; Potential injury or death from unevaluated asphyxiant gas displacing oxygen in a workspace.

Other Safety Concerns (potential hazard sources) for this Facility or Lab

(Required by general corporate business process) traffic related hazards for injury
(Required by general corporate business process) common electrical hazards
(QUESTION 1) potential for minor injury or illness
(QUESTION 1b(3)) potential for minor injury or illness
(QUESTION 4) Potential eye and skin hazards
(QUESTION 5) Potential personnel exposure to chemicals & fire protection regulatory requirements
(QUESTION 7) potential injury from mechanical forces
(QUESTION 9a) Contact with hot or cold objects
(QUESTION 10) Injury or damage
(QUESTION 15) potential for regulatory action
(QUESTION 15d) potential for regulatory action
(QUESTION C3) potential injury to personnel from exposure to hazardous energy
(QUESTION C3) potential injury to personnel from exposure to hazardous energy

Required Training

[Note: This training is a regulatory requirement for one or more people involved in operations associated with identified hazards. Each class may not be required by all people working in the area.] Please note that some training classes are only provided occasionally. Please be sure to allow adequate lead-time for personnel to schedule and complete training.]

NONE

Results Based On Answers

The results in this PHS were based on the following answers to interview questions:

Q 0 answered: Y; Q 1 answered: Y; Q 1a answered: Y; Q 1b(3) answered: Y; Q 4 answered: Y; Q 4a answered: N; Q 5 answered: Y; Q 5a answered: N; Q 5d(1) answered: Y; Q 7 answered: Y; Q 7a answered: N; Q 9a answered: Y; Q 10 answered: Y; Q 10a answered: Y; Q 10d answered: Y; Q 10e answered: Y; Q 10f answered: N; Q 15 answered: Y; Q 15d answered: Y;

Interquestion Dependency Concerns for this Facility or Lab document:

[Note: Interquestion dependency is an automated check for the potential of a missed hazard (e.g. the PHS identifies radioactive waste but does not identify radioactive material). Please review these inconsistencies to ensure the PHS interview questions are answered correctly. There may be valid reasons for these anomalies.]

(QUESTION 101) If local exhaust ventilation (C1) is used, air emissions (15b) are usually generated, but none are indicated. Note: there is no minimum quantity for emissions for a "yes" answer to 15b, and emission treatment devices do not count toward a "no" answer to that question.

XI. EOC Concerns

Chemical; Energized Laser; Energized Mechanical; Energized Systems - RGD; Environmental Concerns; Other Hazard; Pressure